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Development and Crisis in Ancient Rome: the Role of Mediterranean Trade

*Antonio Luigi Paolilli**

Abstract: »Entwicklung und Krise im antiken Rom: Die Rolle des mediterranen Handels«. Between the second and the third century A.D., after centuries characterized by nearly continuous growth, the Roman Empire experienced a profound crisis. Evidence of this crisis comes from important economic signals, such as the fineness of coins and the number of shipwrecks in the Mediterranean Sea. After showing that the empire's economic decline had already begun in the second century A.D., we will outline a hypothesis about the causes of the fall, based on the de-specialization of the Roman economic system, which prevented it from continuing its evolution towards modernity, leading it instead along a path of progressive implosion.

Keywords: Economy of Roman Empire and its decline, fall of Roman Empire.

Between the second and the third century A.D., after centuries characterized by nearly continuous growth and after a period in which the ultimate aim of all its citizens was the perpetuation of the social and economic conditions in which they lived, the Roman Empire experienced a profound crisis. Evidence of this crisis comes from important economic signals, such as the fineness of coins and the number of shipwrecks in the Mediterranean Sea (to be interpreted as a representative sample of the size of Mediterranean trade). Both these aspects point in fact to a real collapse, in concomitance, moreover, with a consistent decrease of population, due in our opinion not only to the plague and war events, but also to the return of the economic system to less integrated production models which were therefore less specialized and productive.

In the next sections, after showing that the empire's economic decline had already begun in the second century A.D., we will outline a hypothesis about the causes of the fall, based on the de-specialization of the Roman economic system, which prevented it from continuing its evolution towards modernity, leading it instead along a path of progressive implosion.

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Some viewpoints about the development and decline of the Roman world

The economy of the Roman Empire, and particularly the reason for its decline, has been at the centre of widespread debate. Not only the creation of the imperial system, but also and above all its decline and fall, have been the subject of constant debate. The problem had already been raised by Gibbon (1776) who, reading *Aristides* (1964 [c. 154]), underlined the greatness and opulence of the empire in the 2nd century, a greatness that seems to make the later decadence inexplicable.

Rostovcev (1926) and Walbank (1946), who did not consider the Roman economy primitive, posed the problem of why it was unable to continue its growth to arrive at an industrial take-off, forcing Western Europe to pass, before reaching this point, through a nearly complete destructuring of its urban, economic and cultural system.

Many theories have been formulated with regard to the problem of the fall of the Roman Empire. An author who has written against the prevailing opinion about the progressive economic and social decline is Ward-Perkins (2005). The scholar opposes above all the thesis which claims that the Empire underwent a transformation rather than a decline and a real fall, underlining instead that the invasions of the Germanic tribes were for the Romans a traumatic event which undermined the economic and social structures of the invaded territories.

The scholar discusses a series of events that contributed to Rome's fall, such as the decline of the Roman military machine, the civil war, and a sequence of ineffective emperors.

Also Heather (2007) reviews a great many reasons which may justify the fall of the Roman Empire, preferring, however, a non endogenous – or not totally economic – explanation: a pernicious combination of external causes (principally the pressure of the Huns, but also the military and political growth of the Germanic tribes) and internal causes. Among these emerge usurpations, civil war and the defeat of an East-West coalition fleet sent to recapture Carthage in 468.

A more endogenous and deterministic viewpoint is on the other hand that of Homer-Dixon (2006), based on the confrontation between economics and thermodynamics. For this scholar the success of the empire depended on its ability to extract energy surpluses, in the form of food, from the imperial territories and concentrate them at the centre, where they enabled the development of a extraordinary degree of organizational complexity. This complexity would not have been possible to establish and maintain without a growing flow of energy from outside the system: the reaching of an equilibrium between the flow of resources and the size of those necessary to conquer too far distant territories was therefore a turning point, from development to recession. Dio-

cletianus sought the remedy to this recession in draconian fiscal measures, but they had the effect of further impoverishing the system. As we can see, in spite of the “thermo-dynamical” approach, this theory recalls the definition of “predatory” systems, that Cameron (2005 [2003]) proposes for the Roman economic system and, more generally, for most of those of the ancient world¹.

It is in fact known that populations of some animal species, if lacking in restraints for their reproductive capacities, instead of becoming stable can grow too much, exhausting the available resources and then themselves declining. Differential equations, like those used in bio-mathematics, have been utilized to describe social phenomena, revealing important analogies (Prigogine, 1979, pp. 54-66).

A further explanation of the decline of the Roman Empire, and also of why its economic and social system did not take the path towards modernity, has been put forward by Schiavone (2002 [1996]). He states that the reason the Roman economy did not develop towards modernity must be sought in the fact that the late republican period, during the transition to the imperial regime, was dominated by the slave economy, also because there was no philosophy making productive labour worthy of consideration. Schiavone, in fact, underlines that the ultimate aim of all the commercial activity in ancient Rome was not the reinvestment in the same activity or in others similar to it, but the purchase of land in order to enter the landed aristocracy, the sole holder of political power and social prestige. Production and commercial activity, moreover, never did free itself from the dependence on political power. The Roman hegemonic class remained substantially closed, in the sense that whoever entered it embraced its ideals and way of living. While on the one hand slave labour can be just as efficient as free labour, and Schiavone furnishes historical examples to support this thesis (Schiavone, 2002 [1996], pp. 124-127), on the other hand slaves do not have the same consumption level as free men². The abundance of slave labour, moreover, tends to keep down the wages of free workers too (Cameron, 2005 [2003], p. 69).

Temin (2001), on the contrary, points out that the Roman economy can be defined as a *market economy* even though the central power played a pre-eminent role in it. As Hopkins (1980) notes, the State imposed taxes, moving wealth toward Rome, Italy and the zones guarded by the legions, and in order to pay taxes, the provinces exported goods to them. In this way it implemented

¹ About the predatory character of many states of the pre-modern world, see also J. Keay, *Storia dell'India*, Roma, Newton & Compton Editori (2001), pp. 221-232, Italian translation of *India, A History*, Harper Collins Publishers (2000).

² Naturally this is not always true. Bloch (2001 [1996], p. 225) underlines that in the late imperial period the figure of the partially autonomous slave-farmer had begun to spread. On the whole, however, we can presume that the demand expressed by a slave-based society, though with varying types of slavery conditions, is smaller than in a society in which there is practically no slavery.

a monetary circuit (with a metallic commodity-money) whose first impulse originated from political and military power.

Production for the market, moreover, never involved the whole imperial system. Many regions, particularly the internal ones, survived because of production for self-consumption. As Temin (2001) writes, “Ships could carry bulky goods across the Mediterranean and up rivers, but it was hard and expensive to carry them over land. Roman roads were not primarily for the transport of goods, and they did not go everywhere [...] The result is that inland locations were less firmly connected to the general market. To a first approximation, the Roman market for bulk commodities extended only slightly beyond where ships could go, although high-value goods could travel to land-locked destinations”.

Production for the market, though impressive in its entirety, never achieved its maximum potential value, and not only for the reasons just given. Once opulence had been achieved for the few, who long only for the perpetuation of their privileges, there was almost no middle class pushing toward continuous development, capable of starting a real commercial revolution, as instead was to happen in the Late Middle Ages.

Mediterranean trade and monetization of the economy in ancient Rome

A great deal has been written about the degree of monetization of the Roman economy. Duncan-Jones (1994) has estimated, for the middle of the second century A.D., a stock of money of approximately twenty billion *sestertii*. If exact, the estimate might be indicative of a considerable degree of monetization, an idea confirmed, moreover, by the research into the composition of ice layers in Greenland and into lake basin sediments in Sweden, Switzerland and Spain (Hong, Candelone, Patterson, Boutron, 1994, 1996; Hong, Candelone, Soutif, Boutron, 1996; Renberg, Persson, Enteryd, 1994; Shotyk, Weiss, Appleby, Cheburkin, Frei, Gloor, Kramers, Reese, Van Der Knaap, 1998).

This research has shown that atmospheric pollution appeared in the northern hemisphere in the Roman age, due to silver, copper and lead mining, at a level not reached again until to the industrial revolution³.

On the other hand, as revealed by Duncan-Jones (1994, pp. 172-179), monetary circulation seems to have been local rather than Mediterranean, and this appears true above all for the centuries after the second century A.D. Lo Cascio (2003) provides an explanation of this phenomenon, suggesting above all that

³ See E. Lo Cascio, “Il denarius e gli scambi intermediterranei”, *Moneta Mercanti Banchieri. I precedenti greci e romani dell'Euro. Atti del convegno internazionale, Cividale del Friuli, 26-28 settembre 2002*, Pisa, Fondazione Niccolò Canussio (2003), pp. 147-165.

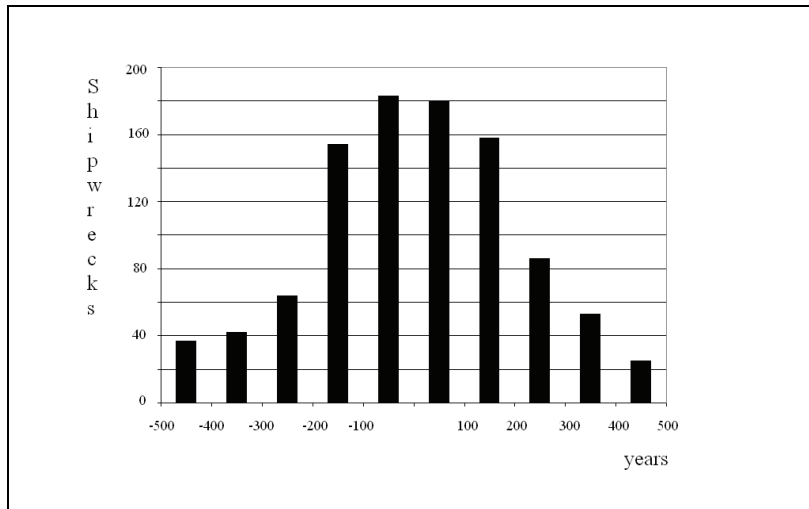
the transfer of money from the provinces to Rome and vice-versa, respectively for taxation and payment of troops, happened only for the settlements and that this, therefore, does not imply a scarcity of Mediterranean trading. The intensity of this trade, however, is witnessed by the number of shipwrecks occurring in the period 200 B.C. – 200 A.D., far more numerous than those of the preceding and following periods (Parker, 1992). On the other hand, evidence of the localization of monetary circulation seems to exist just for the centuries following the end of the adoptive emperors' dynasty.

In examining the data presented by Parker (1992), related to the shipwrecks occurring in the Mediterranean Sea in ancient times, Hopkins (1980) notes in fact that they reached their greatest intensity in the last two centuries B.C. and in the first two A.D. and that, however, in the latter period they were a little less numerous than those of the previous two centuries. As is shown in figure 1, the shipwrecks seem to follow the profile of a *normal* curve, with its peak near the beginning of the Christian age, and this fact therefore seems to denote a reduction in sea traffic which had been slowly going on since the early years of the Empire. Hopkins, however, does not deduce that trading across the Mediterranean was more intense in the two centuries before the birth of Christ than in imperial times, attributing the greater number of shipwrecks in the former period to the piracy, which was interrupted under Pompeus. However we must admit that aggregating the data for centuries, as has been done by Parker (1992, pp. 549-550; see figure 1), or by Hopkins (1980) for periods of two hundred years, does not highlight this explanation.

If instead we construct a histogram using the same data furnished by Parker, but with an aggregation for periods of fifty years, we obtain a more interesting result (see figure 2).

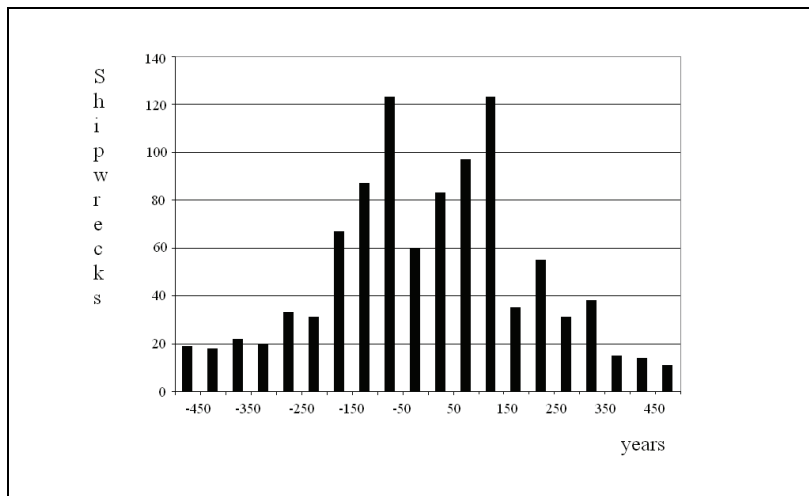
This enables us to see that in accordance with the presumable growth of trading, the shipwrecks seem to follow an exponential trend which finishes at the end of the first half of the second century A.D.. From this trend there was a noticeable divergence, again exponential, only during the period between the battle of Zama (201 B.C.) and the campaign of Pompeus against the pirates (67 B. C.), a period that, as we know and as is also underlined by Hopkins, was characterized by increasing piracy.

Figure 1: Shipwrecks for periods of centuries



The histogram shows the number of shipwrecks in the centuries V B.C. – V A.D., according to the data furnished by Parker (cited, 1992), collected for periods of one hundred years.

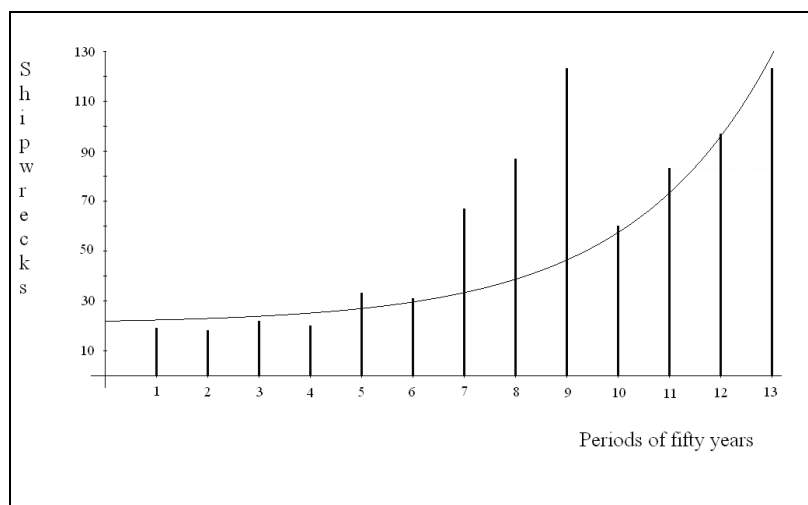
Figure 2: Shipwrecks for periods of fifty years



The histogram shows the number of shipwrecks in the centuries V B.C. – V A.D., according to the data furnished by Parker (cited, 1992), collected for periods of fifty years.

If we interpolate the data relative to the period 500 B.C. – 150 A.D., but with the exclusion of those of the three periods of fifty years characterized by strong pirate activity, we obtain an exponential curve quite near to the actual data (figure 3)⁴, and this fact could induce us to think that the growth of traffic preceded the Roman expansion or, at least, favoured it. Roman expansion and growth of trading in the Mediterranean sea, however, are closely interrelated, and it is difficult to say with certainty which of the two phenomena must be regarded as the independent variable: probably it was a co-evolutionary phenomenon: the navigability of the Mediterranean favoured the forming of a single state along its coasts, but the latter greatly favoured the expansion of maritime traffic.

Figure 3: Actual shipwrecks up to 150 A. D. and their interpolation



In the graph the actual shipwrecks are compared with the exponential curve of interpolation; the shipwrecks of the piracy period (periods 7, 8 and 9), are not considered in the regression.

Decline of the imperial economic model

According to Hopkins' model (1980) cited above, the state, by means of taxation, drew money towards Rome, Italy and the frontier areas in which defensive

⁴ For the interpolation we have utilized the exponential function $y=20.921 + 1.433^x$, where the time x is expressed in periods of fifty years (than varying from 1, for the first period, to 13); y is the number of shipwrecks for each period.

armies were stationed; to pay taxes the provinces exported their goods⁵. This then started a monetary circuit initially triggered by the political and military power⁶. This model has been reviewed by Hopkins himself (1995/96, 2000); however Lo Cascio (2003), who also notes that public finance actually did not place a great burden on the economy of the Empire, admits and underlines that it had a role of *flywheel* in forming the middle and long period trends in the imperial economy taken as a whole. In the author's view, this was due to its structural character, given the slowness of re-equilibration mechanisms (above all the difficulties of transport), and to the crucial role that the single monetary system played, jointly with the other imperial institutions, in reducing transaction costs (the author refers, particularly, to North's theory: North, 1990).

From the second half of the 2nd century A.D. the trend, however, changed direction, proceeding faster too: at the same time the empire, as the single institution unifying the Mediterranean, collapsed. It tried to resist by means of a series of military campaigns, begun under Marcus Aurelius, and then began to divide. The commercial importance of the Mediterranean progressively diminished because the economic structures of the territories changed. Precisely because of the dynamics of the imperial economic system, Italy in particular, which enjoyed a flow of money from the provinces, experienced centuries of higher prices compared to the provinces, with a progressive damage for its internal production, wrong-footed by the competition from the provinces (Lo Cascio, 2003).

While the outlying areas, particularly the Orient, firstly with Odenatus and later with queen Zenobia, and the West with the *Imperium Galliarum*, tended to become self-sufficient also from a military viewpoint, Italy lost its central role in the imperial economy and along with the Balkan peninsula was pillaged by Germanic populations. Aurelianus wanted to reunite the empire, but Diocletianus would politically sanction what was to become an economic and social reality. The reduced importance of the central part of the empire is also shown by the fact that, while it is true that the sea traffic was declining, this did not correspond everywhere to a reduced importance of the monetary economy. With regard to the *Imperium Galliarum*, for example, although the traditional theory is that the Gallic provinces broke with Rome because they were frustrated by its inability to protect them from invasions, some scholars assert that these provinces had reached an economic autonomy and a prosperity that allowed them to obtain political and military independence from Rome (Drinkwater, 1987).

⁵ Hopkins (1980) noted that only a small part of taxes was in nature, for free distribution.

⁶ Hopkins (1980) pointed out that there is a correlation, in the period of second century B.C., between military expenditure and monetary emissions, which however does not necessarily imply a causal relation between the two variables, since they could be linked to a third.

Moreover the progressive achievement of the provinces, also from a political viewpoint, was already shown long before the crisis by the origin of the emperors.

The decline of maritime traffic, however, was not without effects on the economy. The recourse to navigation, in fact, can influence the productivity of the system in two ways. The effect first felt is the reduction of transport costs, making less necessary expensive and difficult haulage (and often enabling otherwise impossible transfers). Transport, moreover, affects a very important “factor”: the geographic division of labour.

In a recent paper (Paolilli, 2005 a), by means of a mathematical model, it was shown that maritime traffic, just by means of the geographic division of labour, can greatly influence the size of the potential production (and therefore of the potential population) of a territory. In effect, by examining figure 2, we can see that from the second half of the second century A.D., shipwrecks and presumably the traffic they were involved in had already diminished, and this coincides with the demographic decline of the empire (although the more direct cause of this decline seems to be the plague). In another work (Paolilli, 2005 b), by means of a similar model, this time applied to the degree of monetization of the economy and therefore in correlation with the monetary exchanges as a whole and not only with maritime trade, it is shown that reductions in population, even though caused by plagues, cannot be recuperated if the economy’s degree of monetization diminishes, pushing the system to a lower level of specialization (and therefore also of productivity). The footnotes give the formula for the calculation of the production of a socio-economic system, obtained from the abovementioned model, and a brief discussion of it⁷.

In the case that we have examined, even without certain data about the reduced degree of monetization of the Roman economy, we can however hypothesize a considerable de-specialization of the production activity, indicated by the fall in maritime traffic. Moreover, the considerable reduction in coin

⁷ The function for the calculation of the potentialities of the system, expressed in terms of potential population, is: $Y = N\mu^{1/\alpha}(\gamma/r)^{1/\alpha}$. It is obtained from the following production function (a Cobb-Douglas type function), applied to a macro-system: $Y = \mu N^\alpha P^\beta K^\gamma - rK$, considering K as a variable to optimize (in the paper cited the production Y coincides with the potential population P , since it is assumed that the unitary production is what is necessary for the survival of an average individual, and it is furthermore supposed $\beta = 0$). N is the “nature” factor, or the soil (expressed in number of individuals who can survive in a given area, without technical intervention) and it is a given, K is the capital (technical means) invested in the various economic activities, r is the coefficient of capital restoration cost, α and γ are the exponents (with $\alpha + \gamma = 1$) respectively of N and K , which quantify the productivity of these factors, and μ is a measure of the system’s degree of monetization. It depends – according with a relation which for the sake of simplicity we omit – on the amount of production entering the monetized commercial circuit, assuming a unitary value in the absence of money, greater than 1 in the opposite case.

fineness, above all of the denarius, and the consequent inflation, along with some evidence of a return to bartering, point to a crisis of the monetary economy.

But why did Mediterranean trade start to decrease? We have mentioned the comparison made by Cameron between the Roman system and a predatory mechanism, as well as the explanation, borrowed from thermo-dynamics, of its decline. As we have outlined, a predatory system can work without crisis only if the resources grow in proportion to the population using them. In the Roman world, from the age of Marcus Aurelius onwards, this clearly did not happen. The productive economy, in many respects, appeared stagnant while, on the contrary, the military costs grew. As explained by Lo Cascio (2003), conquest was really a precondition for the increase of monetisation of the economy, an economy that, as Schiavone writes (2002 [1996], pp. 114-115), was not able to stand on its own feet, being strongly dependent on the political system. In the age of adoptive emperors the empire had already ceased to expand (Adrianus had already decided to abandon some of Traianus' conquests), but instead of decreasing, the military costs grew further. After that dynasty the army's role in the system of power transmission also grew.

When examining the histogram in figure 2 one may suspect that it was precisely the increasing speed of the system that determined its implosion, which could perhaps have been avoided only by means of a radical change in the empire's economic and cultural structure. The system did in fact change, but only to assume lower production levels, with less and less trade and, by following productive models like that of *villae*, in certain respects anticipated the feudal fragmentation, therefore missing the chance to continue its evolution towards modernity.

The models presented in the papers cited are very sensitive to the costs of capital restoration. This, moreover, is in accordance with the increase in shipwrecks in the piracy period which, as we know, caused many difficulties even to the rampant Roman economy of the period, threatening the very survival of the plebeians, which depended on wheat shipped by sea routes.

Coming back to the historical period we are examining, which began with Marcus Aurelius, we can hypothesize an increase of the capital restoration cost (r in the model presented in footnote 7) due to the devastation caused by the increased military activities in the empire's territories. The graph in figure 4 shows that the potential production Y of an economic system is sensitive even to slight (but lasting) variations in this cost⁸. Figure 5, on the other hand, shows

⁸ The parameter values are approximately those presented in Paolilli (2005 b). Only N and μ are quite different: N is 150,000, referring to the Italian territory (see Paolilli, 2005 a), and μ in this work is greater than that used in Paolilli (2005 b) for England of the Roman age., due to the fact that at that time the latter, being a peripheral territory, was presumably less monetised than Italy. Assigning this greater value to μ and assuming, as in Paolilli (2005 b),

how Y varies depending on the value of capital productivity (Y , which in the model depends directly on the technological level. This level, as it is shown in the works cited, is not totally independent on the degree of monetization: scarcely monetized economic systems are presumably not compatible with high technological standards. We can therefore expect that if an economic system returns to self-consumption production, the production level, due to the reduction of synergies between the degree of monetisation and the technological level, may collapse (we must also add that even the reduction of the degree of monetization alone, as is shown by the formula in footnote 7, induces or at least highlights a reduction in the potential production).

The essential point is that the end of the second century saw the breakdown of a mechanism that had assured, but also imposed, an exponential economic growth. The Roman economy was indissolubly linked to politics. When the population began to decline, due to plagues, devastation from the invasions, but also and above all due to the plummeting confidence in money, the economic system retreated to less specialized production modes, therefore becoming less productive. The burden of the state machine however remained the same, or even grew, and this further suffocated economic activities, rendering the single empire simply obsolete: the economic unity of the Mediterranean had failed.

In a world in which money, above all if it was gold or silver money, was real wealth, its continued drain to the East was in fact a problem capable of causing negative repercussions of no small significance. This problem was not new⁹ but, with the cessation of the conquests and the consequent “revenues”, its burden gradually became unsustainable, also and above all because it was worsened by the growing demands of the army, which was more and more necessary and more and more a power broker. The army was more expensive but yielded less.

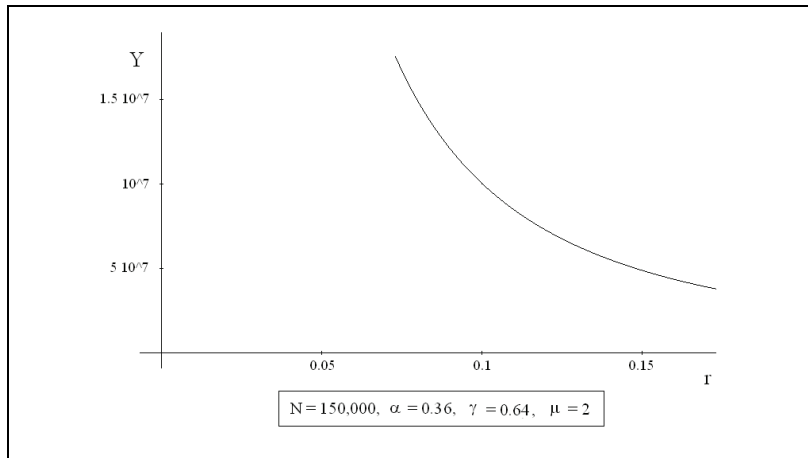
The Roman production circuit jammed, lacking the precious metal which would continue to start it up, given the monetary system based principally on metal coinage¹⁰. The system returned to barter and to an economy that more and more prefigured the feudal one, with the inevitable de-specialization of economic activities and the consequent reduction in global production.

$r = 0.1$, we obtain a potential population, for Italy, of about ten million inhabitants, a value not far from the presumable actual population of that time (Reinhard, Armengaud, Dupaquier, 1971, pp. 66-69). We also assume, as in the paper cited (Paolilli, 2005 b), $\alpha + \gamma = 1$.

⁹ *Plinius Senior* had already complained about the enormous sums dissipated to buy oriental products.

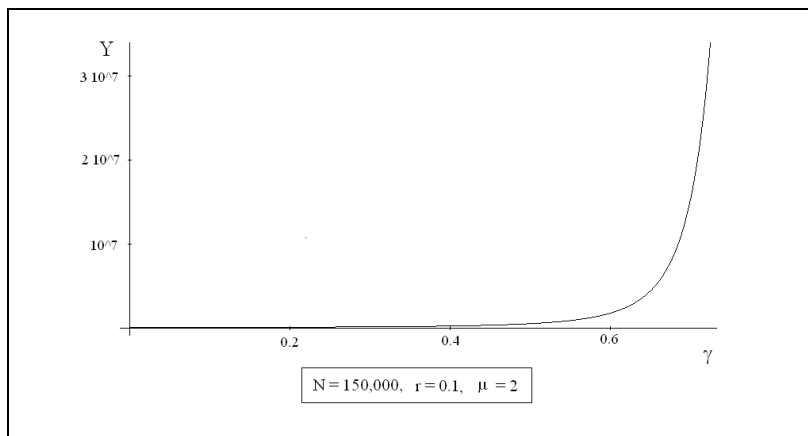
¹⁰ We say “principally”, and not “completely”, because, as shown by Lo Cascio (2003), loans were present in the Roman world, also without paper instruments like those used in the Late Middle Ages.

Figure 4: Relation between the coefficient r and the potential production Y



The graph shows the relation between the capital restoration coefficient r and the potential production Y .

Figure 5: Relation between the value of g and the potential production Y



The graph shows the relation between γ and the potential production Y .

Until it achieved complete domination of the Mediterranean sea and of the territories around it, also the love of luxury (in addition, more generally, to that

of power) stimulated the growth of the Roman economy, which found in military conquests the “fuel” for its maintenance and expansion¹¹.

Once this domination was achieved, however, the fact that there was no place for a middle class capable of bringing a new vigour and new ideals turned the luxury consumption of the upper class from the driving force of growth, albeit based on military dynamics, into a burden for the system, already bearing the more and more burdensome task of maintaining the army and the proletariat of Rome and other principal cities of the empire. To push the system back definitively and to bring an irremediable break-up to its great integration, all it took was a serious demographic crisis.

Conclusions

The Roman Empire, like many states in the ancient world, was, at least partially, a system of the predatory type, with an economy widely based on slave work relations. However, unlike some of these states, which grew to be suddenly replaced by other political subjects without radically changing the life of the subject peoples (apart from the consequences of specific military events), the Roman Empire represents for the territories around the Mediterranean, above all of the western basin, a great influence on development, beyond or maybe due precisely to that co-evolutionary phenomenon mentioned above.

This is testified by the number of shipwrecks, the quantity of money put in circulation, and also their decline.

The reason for this moulding force may lie in the very voracity of the Roman state, which induced such an increment of trade that it profoundly transformed the economic structure and the *weltanschauung* of the European and Mediterranean communities, and this happened in spite of the seemingly scarce effect of taxation on imperial production. During the state’s phase of expansion, whole communities were deported, others were constituted or re-founded, and many were reached by new roads. The Roman state was not, in other words, given the prevailing agricultural structures of the economy of that time, with their scarce surpluses, an absentee state, confining itself to merely perceiving this surplus, but it was a state which re-founded and transformed that structure, greatly increasing the yields, albeit only for a few centuries. When

¹¹ With regard to the role of the fondness for luxury and, more generally, for power, in the origin and expansion of the ancient empires, it could be illuminating the look at analogy with the evolution of species, as it is seen by Jantsch (1980). According to the scholar, “if the drive of evolution were simply adaptation, then evolutionary change should have ceased with the bacteria” because they are able “to mutate and adapt to all kinds of adverse conditions with amazing speed”, while instead it seems that what men and, more generally, living creatures pursue is not only mere survival, but also and perhaps above all the “pure ‘intensification of life’” (the phrases in inverted commas are from Briggs and Peat (1989, p. 155).

the push ceased, in our opinion due to the above-mentioned causes, the economic system collapsed, making the empire more vulnerable also from a political viewpoint, but the world which emerged was not the same. Some structures survived. The means of communication, for example, and not only the actual roads, but also the cultural ones, like Latin, the law, the religion, would serve in the future to put men of different lands back into communication on their way towards a new development.

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